CPAT FLEX Operation Manual (DSG1)

CPAT®

CONTINUOUS MONITORING SYSTEM

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1. General Information

1.1 About this Manual

This manual describes the components, installation and operation of the CPAT FLEX DSG1 unit.

You will find important safety information in this manual. We strongly recommend that all users read this manual. Use of this product other than for its intended application may compromise the unit's safety features.

1.2 Explanation of Symbols Used

The following symbols are used in this Manual:

Symbol	Explanation
	Caution. Indicates that operations or procedures, if carried out without caution, may cause personal injury or damage to the unit.
	Note. Indicates additional information about the product.

1.3 Certifications

This section describes the certifications the DSG1 complies with.

1.3.1 Test Specifications

FCC 47 CFR Part 15, Subpart B – Verification

ICES-003/NMB-003 Issue 4 February 2004

Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: Generic requirements.

1.3.2 Compliance

This Class A digital apparatus complies with Canadian ICES-003/NMB-003.

This Class A digital apparatus also complies with European EN61326-1: 2006.

1.3.3 Note

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his owns expense.

NOTE

Any modifications made to this device that are not approved by Effigis GeoSolutions Inc., may void the authority granted to the user by the FCC to operate this equipment.

1.4 Technical Support

Effigis Technical Support Service is available from Monday through Friday from 9:00 AM to 5:00 PM Eastern Time.

Toll free from U.S. and Canada: + 1 888 495-6577

International: + 1 514 495-0018

Fax questions anytime to: + 1 514 495-4191

cpat@effigis.com

1.5 Calibration

Your DSG1 unit has been calibrated and tested in the factory, and does not need further calibration before use.

However, if the unit suffers damage and needs repair, it is recommended that the unit be returned to an authorized Effigis service center where it will be properly recalibrated.

If your company requires regular calibration of all equipment, or requires a calibration certificate for the DSG1, a calibration service is available through Effigis.

For more information on calibration services, please contact your Effigis representative.

1.6 Effigis Website

Effigis' website contains product specifications, information, press releases, brochures, downloads and Frequently Asked Questions (FAQs). Please visit our website at:

http://effigis.com

2. System Components

2.1 Product Overview

This section describes the DSG1 unit, including its accessories.

The DSG1 is a dual-band signal generator that inserts an ultra-low level signal between quadrature amplitude modulation (QAM) channels, without causing interference or MER degradation. The DSG1 can be operated simultaneously in both aeronautical and LTE bands using two separated RF outputs. The first band operates from 118-140 MHz to satisfy government cable leakage regulatory requirements, and the second band operates from 572-960 MHz to cover cable leakage affecting operation of the long-term evolution (LTE) cellular band.

Each individual carrier can be inserted in the downstream cable network by connecting the two RF outputs to the forward signal combiner. One physical RF output is used per carrier. The global operating status is shown on the LCD display located on the DSG1's front panel. Once installed, this unit requires no further mechanical setup.

2.2 Initial Verification

Your DSG1 unit is calibrated and ready to use right out of the box. Upon reception, visually inspect each item for any damage that may have occurred during shipping. If you see any signs of physical damage, please contact Effigis:

- Callers from the U.S. and Canada can dial + 1 888-495-6577 (toll-free number).
- International callers can dial + 1 514-495-0018.

Make sure no items are missing. Your package should contain all the standard items as well as any accessories you may have ordered. If you ordered the DSG1 - Head-end Based Digital Signal Generator kit, the following items are included:

- DSG1 rack mount unit
- 2 rack mount right angle brackets
- AC/DC adapter
- Operation manual (this manual).

Figure 1: DSG1, rack mount brackets and AC/DC adapter

If any of the standard accessories are lost or damaged, you can order a replacement for the DSG1. Please quote the following part numbers when placing an order:

Part No.	**Accessory Description**
(1) 5515	DSG1 AC/DC adapter
(2) 5516	DSG1 Operation Manual (this guide)

To place an order, please call Effigis at + 1 888-495-6577 or + 1 514-495-0018

1

2

3. Installation

This section describes how to install the DSG1. You may also refer to the installation diagram at the end of this manual.

3.1 Mounting the DSG1 in an Equipment Rack

CAUTION!

Leave space for front, back and lateral ventilation.

3.2 Connecting RF Outputs

The RF outputs should be connected directly into the cable network's RF forward combiners.

CAUTION!

In order to avoid unwanted interference with the QAMs in the cable network, first set up the frequencies and output levels as described in section 4 before connecting the RF outputs.

NOTE

Do not leave any RF outputs unterminated. If one of the outputs is not connected to the network, put a 75 Ohms F terminator on the output.

3.3 Electrical Installation

The AC/DC adapter is supplied with the equipment. It is compatible with 110V/220V and 50/60 Hz power distribution networks.

3.4 Internet Connection (optional)

The DSG1 can utilize an Internet connection to read operating parameters from the CPAT servers and to update firmware automatically. The Internet connection might also be useful for remote diagnostics, if needed. When connected, the unit checks for new parameters or updates every 5 minutes. Transfers amount to a few hundred kilobytes per day.

To ensure that the DSG1 can communicate with the CPAT FTP server and obtain its parameters and update files, you must have the following:

- DHCP enabled on the network

The DSG1's IPv4 address is acquired through dynamic host configuration protocol (DHCP). If no DHCP server is present on the network, the system will not be able to transmit data over the network.

- FTP port 21 must be open

Make sure the unit can access the Internet and that file transfer protocol (FTP) port 21 is open. Without this access, the unit will not be able to communicate with the CPAT FTP server nor download its parameters and update files.

NOTE

It is recommended that you install the DSG1 behind a firewall, or a router with an integrated firewall, to avoid malicious or unauthorized connections (Ref: http://www.kb.cert.org/vuls/id/107886).

4. Setup

CAUTION!

Any changes to the setup of the DSG1 carriers must also be made to the DRV3 receivers deployed on the field. Using different parameters will prevent the leakage detection from working as intended.

The table below details parameters that can be set:

Band	Parameter	Values
Mid	Frequency	From 118 to 140 MHz
	Mode	1: AM 3-110 Hz
	Output Level	From 10 to 50 dBmV
LTE	Frequency	From 572 to 960 MHz
	Mode	1: AM 3-110 Hz
	Output Level	From 10 to 50 dBmV
Both	Transmit carriers	1:Yes 2:No

NOTE

When changing the frequencies on the DSG1 and DRV3, make sure that you use the appropriate antenna on the DRV3 units to match the selected frequencies.

4.1 Determining Frequencies and Output Levels

To avoid interference, the frequency of both carriers, Mid and LTE bands, must be set to fit between the adjacent QAMs. Hence, the frequency of DSG1's carriers is set right on the center of the gap between the adjacent QAMs.

The recommended output level is from 20 to 30 dB below the adjacent QAM level. Higher levels will increase leakage detection efficiency, but might cause MER degradation to adjacent QAMs. The reference level of the QAM must be measured on the whole QAM channel bandwidth (6 MHz).

4.2 Set Parameters Remotely

You can set the DSG1 operating parameters by remote through the CPAT web application. It stores active parameters in its database and stores a copy in a text file that can be downloaded automatically by the DSG1.

4.2.1 FTP connection

Once step “3.4 Internet Connection” has been completed, make sure that the unit has access to the Internet and that FTP port 21 is open. This is required in order for the DSG1 to communicate with the CPAT FTP server.

4.2.2 Set DSG1 operating parameters

That step must be completed by the CPAT support team. To modify one or more parameters, you must provided the DSG1 serial number (e.g.: DSG1-10001), its location (optional), and the parameters you want to modify. The update will be entered in the CPAT database, and a few minutes later, automatically downloaded by the DSG1.

4.3 Set parameters using the DSG1 settings application

4.3.1 Download and install the application

The DSG1 settings application is a standalone WinForms desktop application named “DSG1Settings.exe”. It is available for download at http://effigis.com/produits/cpat-monitoring-des-reseaux-hfc/ressources-cpat, in the Product download section.

.NET Framework 3.5 is a prerequisite and can be downloaded from http://www.microsoft.com/en-us/download/details.aspx?id=22 (about 2.8 MB).

The Application can be saved anywhere on your computer and needs no further installation or configuration.

4.3.2 Connection setup

To be able to communicate, the DSG1 must be physically connected with an RJ-45 Ethernet cable to a device offering DHCP service. This service can be offered by the router to which your computer is connected, or available directly through a standalone laptop computer with a DHCP server installed on it.

The DSG1 exchange files with the CPAT FTP server every 5 minutes. It looks for parameters file (less than 1 Kb).

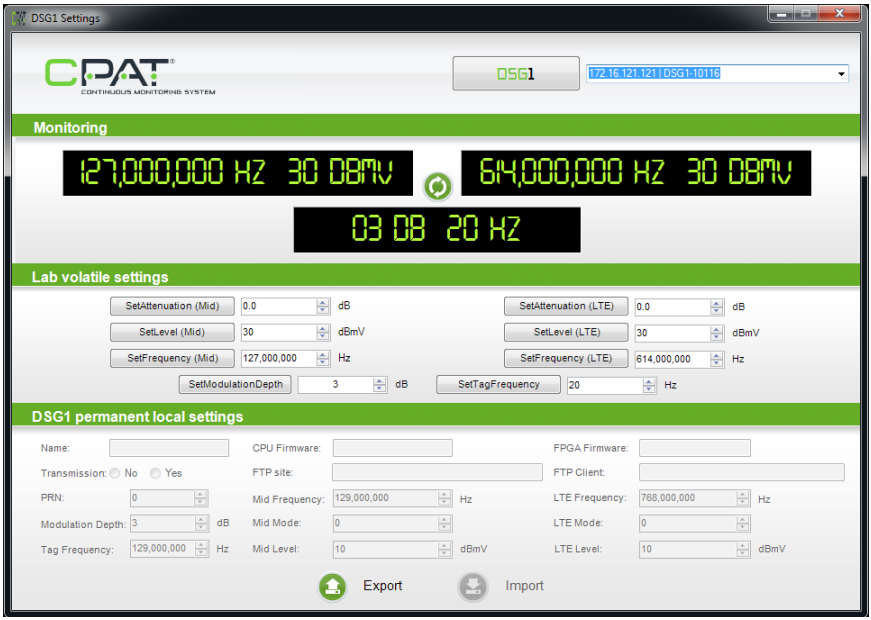
4.3.3 Using the DSG1 settings applications

At startup, the DSG1 settings application displays a "*DSG1*" button. When you click it, the application starts looking for all DSG1 units connected on the network.

If several DSG1 units are found, the first DSG1 found is selected by default. To select a different DSG1, choose another DSG1 from the dropdown menu next to the "*DSG1*" button.

If no DSG1 units are found, the system displays a special message ("No DSG1 found on the network"). Make sure that:

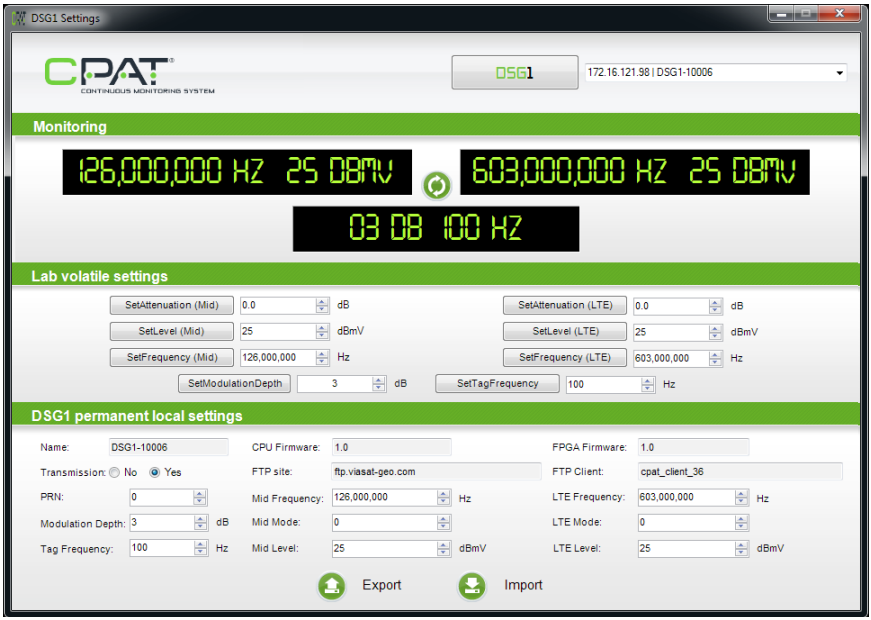
- the DSG1 is connected to the network or laptop
- a DHCP server is available
- the IP address family of the DSG1 (displayed on the LCD screen) is reachable by the computer
- no firewall is blocking UDP port 9051 (used by the DSG1 on first connection)



When a DSG1 is selected, the currently applied settings are summarized in the "Monitoring" panel. All "*Lab volatile settings*" functions become available for modification, if necessary. You can edit the attenuation, frequency and level of both bands within the allowed limits. However, since these settings are volatile, any changes will be lost after a reboot of the DSG1, and the default settings will be applied until you edit them again.

A "*Refresh*" button is available between the two outputs in the "*Monitoring*" panel to perform a new current settings query.

An "*Export*" button is available in the "DSG1 Permanent local settings": when pressed, the default settings (CPU and FPGA firmware version, FTP URL and user name, startup frequency, mode and level for each band, Transmission activation and startup PRN) are fetched from the DSG1 and displayed in the "DSG1 Permanent local settings" panel.



After the first successful Export, an “Import” button becomes available in the “DSG1 Permanent local settings”. The Import function applies the DSG1’s editable default settings (startup frequency, mode and level for each band, transmission activation and startup PRN). These settings are effective immediately, and they become the new default settings for the next startup.

NOTE

The DSG1 will always try to connect to the CPAT FTP server. If it succeeds, the DSG1 will download the active parameters file and overwrite the current one. To avoid this, do not connect the DSG1 to the Internet until the parameters have also been set on the CPAT database and stored on the FTP server.

5. System Operation

5.1 Power On

To power on the unit, make sure that the power cable is properly connected to a surge-protected outlet (recommended) and to the DSG1. Press the ON/OFF button on the front panel for 3 seconds, and then release it. You should see both lights on the front panel turn green, and then the PWR light will turn red.

5.2 LED and LCD Information

The two front LEDs indicate the status of the unit.

PWR (power):

- When steadily lit RED, the system is booting (takes about 1 minute to boot).
- When steadily lit GREEN, the system is powered up and booted.

DIAG (diagnostic):

- When OFF, the system is working normally.
- When flashing RED, an error has occurred.

The LCD screen provides information about the unit. It scrolls through the settings to display the following information:

- Output frequencies for Mid and LTE bands
- Output levels for Mid and LTE bands
- IP address. When there is a problem, several messages can be displayed:
- “NO IP ADDRESS”: No IP address is assigned to the unit. Verify that the network cable is plug into the Ethernet jack.
- “FTP ERROR”: The DSG1 unit cannot transmit data to the Effigis FTP server. Make sure that the unit has access to the Internet. Note that the unit can acquire a valid IP address, but if there is no routing to the Internet, this message will be displayed.

5.3 Communication

The DSG1 exchange files with the CPAT FTP server every 5 minutes. It looks for parameters file (less than 1 Kb).

5.4 Shutdown

There are two ways to power off the unit: Normal and Force Shutdown. The preferred mode is Normal shutdown to avoid undesired flash memory corruption. The Force Shutdown function should be used ONLY if the device is not responding.

5.4.1 Normal Shutdown:

In normal running mode, press the front panel ON/OFF push button for 1 second then let the DSG1 shut down each process properly. A message will then appear on the front LCD screen, and the device will turn off.

5.4.2 Force Shutdown:

To force the DSG1 to power down when it is running, press the ON/OFF button on the front panel for 3 seconds. When the unit has shut down, release the button. Use this shutdown method only if the normal shutdown method fails.

6. System Maintenance

6.1 Cleaning the Equipment

Your DSG1 unit can be wiped clean with a damp cloth. Do not immerse the unit in water. Avoid solvents and commercial cleaners.

6.2 Preventive Maintenance

The technician shall perform periodic visual inspections on the RF connections to make sure that there is nothing loose or broken which could affect the performance of the system. If any replacement parts are required, please contact Effigis for more information.

7. Updates and Recovery

The DSG1 device can be updated manually or automatically, obtaining its firmware when needed via updates provided from the CPAT FTP server.

7.1 Automatic Update

The DSG1 device is usually automatically updated when needed. The updates are distributed from the CPAT FTP server to the device. All update are tested to ensure high quality and efficiency in Effigis products. There is no need for external intervention on the device to update it when using the automatic update function.

7.2 Manual System Recovery

See the Remote Troubleshooting section.

8. Remote Troubleshooting

It is possible to access the DSG1 for remote assistance. Also, manual firmware and script updates can be achieved. If the problem is the Internet connection, it will not possible to do so.

Contact support (see section 1.4 Technical Support)

Appendix A – Specifications

A.1 System

Modulator type	Dual-band digital signal modulator
Frequency range output 1 of 2	Agile from 118 to 140 MHz (Mid-band)
Frequency range output 2 of 2	Agile from 572 to 960 MHz (LTE-band)
Frequency stability	Mid-band: ±500 Hz LTE-band: ±2.5 kHz
Tuning resolution	1 kHz
Modulated signal	10 to 110 Hz AM tag
Output level from each RF output	from +10 to 50 dBmV
Status display	Through an LCD on front panel
Communication port	10/100Base-T Ethernet
Setup	Through CPAT interface
Power	120 VAC, 0.5A (15W) fully loaded

A.2 Physical

Dimensions	Standard 1RU chassis 4.4 cm x 21 cm x 33 cm / 1.75” x 8” x 13” [H x W x D]
Operating temperature	-20° to +60° C / -4° to +140° F

Appendix B – Our Services

Effigis offers a portfolio of services to deploy and support purchased equipment through its Customer Support organization. Customer Support is standard with every product sale and consists of business hour technical assistance, in-warranty repair and calibration.

B.1 System

Customer Support is accompanied with the sale of every Effigis product. Customer Support services include:

- Product and Service Literature
- Technical Assistance (Business Hours)
- Equipment Repair (Under Warranty Repair and Calibration Services)
- Equipment Return Authorizations

Contact a Customer Support representative through your local distributor or by visiting www.effigis.com for information on calibration and warranty policies.

B.1.1 Equipment Return Instructions

Please contact your local Customer Support location via telephone for Return Authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address, and telephone number
- The serial number, product type, and model
- Warranty status (If you are unsure of the warranty status of your instrument, contact Effigis' Customer Support)
- A detailed description of the problem or service requested
- The name and telephone number of the person to contact regarding questions about the repair
- The return authorization (RA) number

If possible, return the equipment using the original shipping container and material. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit; when needed, appropriate packing materials can be obtained by contacting Effigis Support. Effigis is not liable for any damage that may occur during shipping. The customer should clearly mark the Effigis' issued RA or reference number on the outside of the package and ship it prepaid and insured to Effigis.

Equipment repaired or replaced under warranty will be returned at Effigis's expense to Customer (Canada/USA) or Effigis' representative (all other countries).

B.2 Limited Product Warranty

B.2.1 Hardware

Effigis warrants to the original end user (Customer) that the new Effigis branded products will be free from defects in workmanship and materials, under normal use, for one (1) year from the date of original shipment.

Effigis warrants repaired products for ninety (90) days from date of shipment. Any Product repaired or replaced under warranty is only warranted for the period of time remaining in the original warranty for the Product.

Any third party products, including software, included with Effigis products are not covered by this Effigis warranty and Effigis makes no representations or warranties on behalf of such third parties. Any warranty on such products is from the supplier or licensor of the product.

B.2.2 Software

Effigis warrants to the Customer that new Effigis branded software and firmware will perform in substantial conformance to program specifications for a period of ninety (90) days from the date of original shipment. Effigis warrants the media containing software against failure during the warranty period.

Effigis makes no warranty or representation that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected.

B.2.3 Exclusions

This warranty excludes:

- Damage to the physical surface of the product, including cracks or scratches to any part.
- Damage caused by misuse, neglect, improper installation or testing, unauthorized attempts to open, repair, or modify the product, or any other cause beyond the range of the intended use.
- Use of the product with any non-recommended device or service if such device or service causes the problem.
- Installation or maintenance of Product by someone other than Effigis or persons certified by Effigis.
- Changes to the Customer environment in which Product was installed.

- Damage caused by accident, fire, power changes, other hazards, or acts of nature.
- Consumable Product or parts thereof (e.g., parts with an expected useful life of less than ninety (90) days).
- Product not returned in accordance with Effigis' RA procedure.

B.2.4 Refurbished Parts and Prior Testing

Product may incorporate reconditioned or refurbished parts or subassemblies and may have been used in testing prior to sale.

B.2.5 Exclusive Remedies

If any Product materially fails to conform to the limited warranty set forth in this Section (Limited Warranty) and actually fails during the applicable warranty period and under normal use, Effigis shall, at its sole discretion (i) repair or replace the non-conforming Product to remedy the nonconformity identified by Customer in accordance with this Section (Limited Product Warranty); or (ii) issue a credit to Customer for the amounts paid for the Product in exchange for return of the nonconforming Product, in which case Customer's licenses to any Firmware shall be automatically revoked. Customer hereby transfers to Effigis title and ownership of any parts that Effigis replaces.

B.2.6 Disclaimer

THE REMEDIES EXPRESSLY PROVIDED IN THIS SECTION WILL BE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES AND SHALL BE IN LIEU OF ANY OTHER RIGHTS OR REMEDIES CUSTOMER MAY HAVE AGAINST EFFIGIS WITH RESPECT TO ANY NON-CONFORMANCE OF PRODUCTS. EXCEPT AS SPECIFIED IN THIS LIMITED PRODUCT WARRANTY, EFFIGIS MAKES NO EXPRESS REPRESENTATIONS OR WARRANTIES WITH REGARD TO ANY PRODUCT. EFFIGIS DISCLAIMS ALL IMPLIED WARRANTIES, CONDITIONS, AND REPRESENTATIONS INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, REGARDLESS OF THE LEGAL THEORY ON WHICH SUCH IMPLIED WARRANTY MAY BE BASED, INCLUDING, WITHOUT LIMITATION, CONTRACT, COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

CPAT® FLEX

DSG1 - Schematic Diagram

1. Internet Connection to CPAT Server

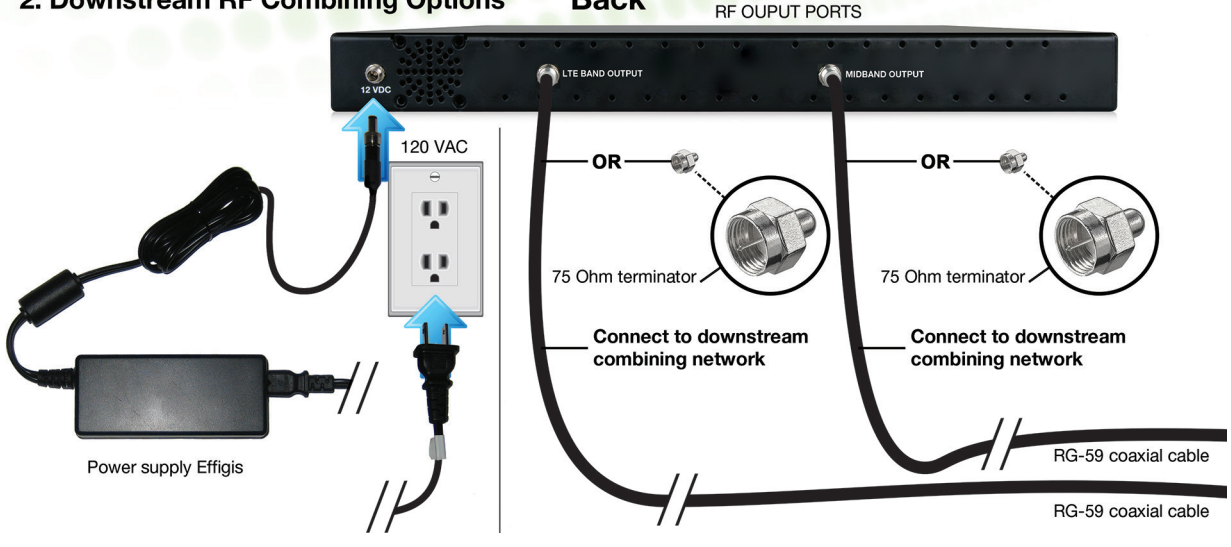
Front

Ethernet switch client

Ethernet 10/100 Base T

2. Downstream RF Combining Options

Back



effigis.com

1.888.495.6577